

ABSTRACT

The invention relates to an arrangement and a method for generating ultrashort laser pulses. The aim of the invention is to avoid the deterioration of the beam quality caused by the plurality of required revolutions, the accompanying loss of revolutions, and pulse broadening in regenerative amplifiers by means of a simpler and more cost-effective laser installation, and to provide ultrashort laser pulses with pulse repeat rates in an extended kHz range. In an installation consisting of a solid-state laser oscillator, a multi-stage laser amplifier which is arranged downstream therefrom and is used to increase the energy of pulses, and at least one switching element for selecting pulses from a pulse train provided by the solid-state laser oscillator, a small-signal gain higher than 10 is provided in an amplifying laser crystal in each amplification stage, the total small-signal gain produced by all amplifying laser crystals amounting to more than 100. In this way, ultrashort laser pulses having pulse lengths which are especially below 20 ps, pulse repeat rates between 1000 Hz and 10 MHz and pulse energies in the mJ range are generated, said ultrashort laser pulses being applicable in the fields of micromaterial machining and medicine.